PIGEON LAKE

Lagrange County

2007 Fish Management Report

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EXECUTIVE SUMMARY

- A general lake survey was conducted on Pigeon Lake on May 29 through June 1, 2007. Water chemistry and aquatic vegetation data were also collected.

- The Secchi disk reading at Pigeon Lake was 9 ft and dissolved oxygen concentrations were not adequate for fish survival below 15 ft. Submersed vegetation was found to a maximum depth of 13 ft. Coontail was the most common submersed plant found in Pigeon Lake followed by flat-stem pondweed and elodea. Only six species of submersed plants were collected during the survey and one other was observed but not collected.

- A total of 562 fish representing 25 species was collected during this survey. Bluegills ranked first by number, followed by golden redhorse and largemouth bass. Northern pike was the dominant species collected by weight followed by golden redhorse, bluegill and common carp.

- Largemouth bass grew at an average rate for northern Indiana natural lakes while bluegills grew at an above average rate. Bluegills provide the best fishing opportunities at Pigeon Lake as 50% of those collected were 6 in TL or larger and individuals up to 9 in TL were collected.

- Several other sport species were collected during the current survey although not in large numbers. These include black crappie, channel catfish, northern pike, redear, rock bass, smallmouth bass, yellow perch and rainbow trout.

- The main concern for the welfare of the fishery at Pigeon Lake is the presence of gizzard shad. DFW biologists should conduct a follow up survey in a few years to determine what impacts, if any, the shad are having on the Pigeon Lake fishery.

- DFW biologists should monitor other lakes in the Pigeon River watershed below the Ontario dam that are susceptible to the migration of gizzard shad from the Pigeon River or Pigeon Lake so that any future invasions of this nuisance species may be detected. As part of this monitoring program, the outlets of lakes that could be invaded by the shad should be inspected to determine the feasibility of erecting barriers to prevent shad from entering the lake.

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INTRODUCTION

Pigeon Lake is a 61-acre natural lake located approximately three miles east of Howe, Indiana in Lagrange County. It has a maximum depth of 35 feet and an average depth of 19 feet. The main inlet and outlet of Pigeon Lake is the Pigeon River which originates from Cedar Swamp in Steuben County and flows through several lakes and impoundments before entering the lake. The river enters the lake on the north end and quickly leaves the lake on the same shore approximately 150 feet further west. Buck Creek is the other inlet to Pigeon Lake. This creek flows into the lake on the west shore from Buck Lake. There is a state owned access site with a concrete boat ramp located on the west side of the lake off of County Road 485 N.

The northern 2/3 of the west shoreline of Pigeon Lake is developed residentially while the remainder of the shoreline is wooded.

The initial fisheries survey of Pigeon Lake was conducted in 1979 by Division of Fish and Wildlife (DFW) biologists. The purpose of this survey was to evaluate the quality of the sport fishery. The major sport fish collected were bluegills, black crappies and largemouth bass (Table 1). The Pigeon Lake fishery was considered satisfactory and no management was recommended. The current survey was conducted to evaluate fish population changes since the initial survey.

METHODS

This survey was conducted from May 29 through June 1, 2007 as part of DFW Work Plan 300FW1F10D40621 that covers management of fish populations in natural lakes. Several physical and chemical characteristics of the water were measured in the deepest area of the lake according to the Manual of Fisheries Survey Methods (2001) standard lake survey guidelines. Submersed aquatic vegetation was sampled on August 13, 2007 using methods outlined in the Tier II Aquatic Vegetation Survey Protocol developed by the DFW Lake and River Enhancement Program and used in their aquatic vegetation control grant program. A global positioning system (GPS) device was used to record the location of the limnological data collection site, aquatic vegetation sample sites, and fish collection sites.

Fish were collected by pulsed D.C. electrofishing the shoreline at night with two dippers for 0.67 hours. One trap net and two experimental-mesh gill net were also fished overnight for three nights. All fish collected were measured to the nearest 0.1 in TL. Summary length-frequency tables were constructed for species of concern with inch groups consisting of

individuals measuring from X.0 to X.4 in TL and half inch groups consisting of individuals measuring from X.5 to X.9 in TL. Length-weight regression equations for Fish Management District 2 were used to estimate the weight of all fish within the sample. Five scale samples per half-inch group were collected from game species for age and growth analysis. Average length-at-age for these species was estimated using the Fraser-Lee method of back calculation and standard intercepts (DeVries and Frie 1996, Carlander 1982). Age length keys were also constructed to determine mean length at age at the time of collection.

RESULTS

The Secchi disk reading at Pigeon Lake was 9 ft and dissolved oxygen concentrations were adequate for fish survival above 15 ft. Forty sites were randomly sampled during the submergent plant survey, 34 of which fell within the littoral zone in water 13 ft in depth or less. A total of six native and one exotic species were identified. Aquatic plants were observed at 18 of the 34 littoral sites sampled. The maximum number of plant species found at one site was four and the mean was one. Coontail was the dominant plant collected followed by flat-stem pondweed, elodea and long-leaf pondweed. Curly-leaf pondweed, an invasive exotic species, was observed in the lake but not collected at any of the sample sites. Five emergent, floating or floating leaf plants associated with wetlands, arrowhead, lizard's tail, pickerelweed, spatterdock and white water lily, were also observed. This marks the first time lizard's tail had been observed in a District 2 natural lake by DFW biologists. Lizard's tail is native to eastern North America, including Indiana. It is sometimes sold as an ornamental aquatic plant for water gardens. The plant is characterized by heart-shaped leaves and a long cluster of white flowers that extends from the plant, sometimes horizontally. The presence of lizard's tail at Pigeon Lake is restricted to one small area on the west shore along the residential area.

A total of 562 fish representing 24 species was collected from Pigeon Lake in 2007. Numerically, bluegill was the top species collected (50%) followed by golden redhorse (11%) and largemouth bass (10%). Northern pike was the dominant species collected by weight (16%) followed by golden redhorse (14%), bluegill (14%) and common carp (12%).

Bluegills ranked first by number (50%) and third by weight (14%) among all species collected during this survey. A total of 281 bluegills weighing 39.3 pounds was captured. They ranged in length from 1.8 (age 1) to 9.0 (age 6) in TL and averaged 5.0 in TL. During electrofishing bluegills were collected at a rate of 336 fish per hour while eight bluegills per lift

were collected during gill netting while trap netting yielded three bluegills per lift. Bluegills 6.0 in TL or larger, considered harvestable size, comprised 31% of the sample, reaching this size during their second and third year of life. Six age groups of bluegills were represented in the sample, all of which grew at an above average rate for northern Indiana natural lakes. In 1979, bluegill ranked third numerically comprising only 16% of the sample. Approximately 91% of these fish were harvestable size, although the sample was small with only 89 bluegills collected.

Sixty-one golden redhorse ranging in length from 4.6 to 18.8 in TL were collected during this survey. Numerically, they ranked second among all species collected (11%) and the 41.1 pounds of redhorse in the sample also ranked second (14%). All but six of the redhorse were captured by electrofishing. Golden redhorse was the dominant species in the 1979 survey by both number (29%) and weight (47.5%).

A total of 54 largemouth bass weighing approximately 28.4 pounds was collected. Largemouth bass ranked third by number (10%) and seventh by weight (10%) among all species collected. They ranged in length from 3.2 (age 1) to 14.2 (age 5) in TL and averaged 9.4 in TL. Harvestable size largemouth bass (14 in TL or larger) comprised only 7% of the sample. Bass reached this size during their fourth and fifth year of life. Largemouth bass grew at an average rate for northern Indiana natural lakes. Electrofishing yielded a catch of 75 bass per hour and one bass was collected during gill netting. No bass were collected in trap nets. A total of 27 largemouth bass comprising 5% of the sample were collected in 1979. Only one of these fish was harvestable size.

Gizzard shad were detected in Pigeon Lake for the first time ever during this survey. They entered the lower stretches of the Pigeon River from the St. Joseph River in Michigan after a dam failed in the lower Pigeon River. This marks the farthest upstream point in the Pigeon River that shad have been found and at this time is the only lake in the watershed their presence has been verified. A total of 35 gizzard shad ranging in length from 12.8 (age 2) to 16.6 (age 4) in TL and weighing 31.0 pounds were captured during this survey. Shad are recognized as an undesirable species as they compete heavily with panfish for food resulting in slow growing panfish populations containing few large individuals that are attractive to fisherman.

Several other sport species were collected during the current survey although not in large numbers. These include black crappie, channel catfish, northern pike, redear, rock bass, smallmouth bass, yellow perch and rainbow trout. Most notable of these as far as making a contribution to the fishery are the northern pike. Pike was the number one species collected by

weight (16%). In all, 11 pike weighing 47 pounds and ranging in length from 22 to 33 in TL were in the sample. All of the pike collected exceeded the legal size limit of 20 inches.

DISCUSSION

Bluegills and largemouth bass dominate Pigeon Lake's sport fishery with numerous other sport species providing additional angling opportunities, although in smaller numbers. Approximately 60% of the fish sample was comprised of largemouth bass and bluegills by number and they represented 24% of the sample by weight. These species are available in sizes attractive to anglers. Additional sport species collected included black crappie, channel catfish, northern pike, redear, rock bass, smallmouth bass, yellow perch and rainbow trout. Although they were not captured in large numbers, their presence in the fishery offers anglers other opportunities. The flow of the Pigeon River into the lake subjects it to extreme water level fluctuations as the watershed of the river is quite large at this point downstream of its origin. There is uncontrolled ingress and egress of many of the riverine species that inhabit the Pigeon River, such as golden redhorse, which limits management of the fish population of the lake.

Bluegills in Pigeon Lake grow at an above average rate for northern Indiana natural lakes and provide a very attractive fishery for anglers as 50% of these were harvestable size and individuals up to 9 in TL were collected.

An adequate largemouth bass fishery exists in Pigeon Lake although only four legal size fish were collected. Largemouth bass grew at an average rate for northern Indiana natural lakes and a plentiful forage base should continue to promote good growth. It is not unusual for bass collections conducted later in the year as the water warms to fail to yield good numbers of larger bass.

It is worth noting that Pigeon Lake has developed a reputation among anglers over the past several years as a good early spring and late fall walleye fishery. Walleye have been present in the Pigeon River system for a number of years. These fish probably found their way up the river from the St. Joseph River much the same way as gizzard shad. In addition, the DFW raised fingerling walleye in a couple of small ponds off of the main channel of the Pigeon River in the 1990's and stocked these fish in area lakes. Following harvest, any fish remaining in these ponds were allowed to migrate down into the river. It is not out of the question that a small walleye population was established in the Pigeon River from these releases. Although no walleye were collected during this survey, the DFW has no reason to dispute the validity of any of the claims

as to the existence of a walleye fishery in Pigeon Lake.

The fact that gizzard shad have found their way into Pigeon Lake is disturbing. Gizzard shad are notorious for impacting bluegill fishing as they generally out-compete bluegill for food resulting in slow growing populations with few large individuals. This is a special concern in Pigeon Lake due to the presence of a fast growing bluegill population which provides good fishing. Lake residents commented to DFW biologist during the current survey that bluegills are a very popular fish at Pigeon Lake and receive good fishing pressure from anglers. Shad do provide forage for largemouth bass, however their rapid growth quickly makes them unavailable as a bass food. Currently, shad can only move upstream in the Pigeon River to the dam located at Ontario, which is just east of Howe.

While not extremely abundant, aquatic vegetation in Pigeon Lake is present at a level that provides good habitat for game species without inhibiting angling activities.

The water quality at Pigeon Lake is considered fair. No fish diseases or parasites were observed during the survey. Shoreline erosion was minimal.

RECOMMENDATIONS

- The main concern for the welfare of the fishery at Pigeon Lake is the presence of gizzard shad. DFW biologists should conduct a follow up survey in a few years to determine what impacts, if any, the shad are having on the Pigeon Lake fishery.

- DFW biologists should monitor other streams and lakes in the Pigeon River watershed below the Ontario dam that are susceptible to the migration of gizzard shad from the Pigeon River or Pigeon Lake so that any future invasions of this nuisance species may be detected. As part of this monitoring program, the outlets of lakes that could be invaded by the shad should be inspected to determine the feasibility of erecting barriers to prevent shad from entering the lake.

LITERATURE CITED

Carlander, K. D. 1982. Standard intercepts for calculating length from scale measurements for some centrarchid and percid fishes. Transactions of the American Fisheries Society 111:332-336.

DeVries, D. R. and R.V. Frie. 1996. Determination of Age and Growth. Pages 483-512 *in* B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

Submitted by: Larry A. Koza, Assistant Fisheries Biologist
Date: 1/22/08

Approved by: Stuart Shipman
North Region Fisheries Supervisor
Date: 2/14/08

Table 1. Sampling effort, species composition and relative abundance of fish collected during 1979 and 2007 fisheries surveys of Pigeon Lake.

Species	1979	2007
Black crappie	105	11
Bluegill	89	281
Bluntnose minnow		1
Bowfin	5	2
Brown bullhead	1	5
Channel catfish		2
Common carp	1	5
Common shiner	3	
Gizzard shad		35
Golden redhorse	160	61
Golden shiner	10	4
Lake chubsucker	1	
Largemouth bass	27	54
Longnose gar	1	
Northern pike	17	11
Pumpkinseed	4	3
Rainbow trout		1
Redear		2
Rock bass	7	5
Smallmouth bass	8	9
Spotted gar		2
Spotted sucker	45	42
Trout perch		1
Warmouth	12	2
White sucker	26	12
Yellow bullhead	11	1
Yellow perch	21	9
Total	554	562
Sampling Effort		
Electrofishing Effort	1.0 h DC	0.67h DC
Gill Net Effort	12 lifts	6 lifts
Trap Net Effort	8 lifts	3 lifts

Table 2. Relative abundance by select size ranges for bluegill and largemouth bass collected during the 1979 and 2007 fisheries surveys of Pigeon Lake.

Species	Length Range (TL)	1979	2007
Bluegill	3.0-5.5 in	8	188
	6.0-6.5 in	43	29
	7.0-7.5 in	34	32
	≥ 8.0 in	4	25
Largemouth bass	8.0-9.5 in	4	8
	10.0-11.5 in	4	16
	12.0-13.5 in	7	6
	14.0-17.5 in	1	4
	≥ 18.0 in	0	0

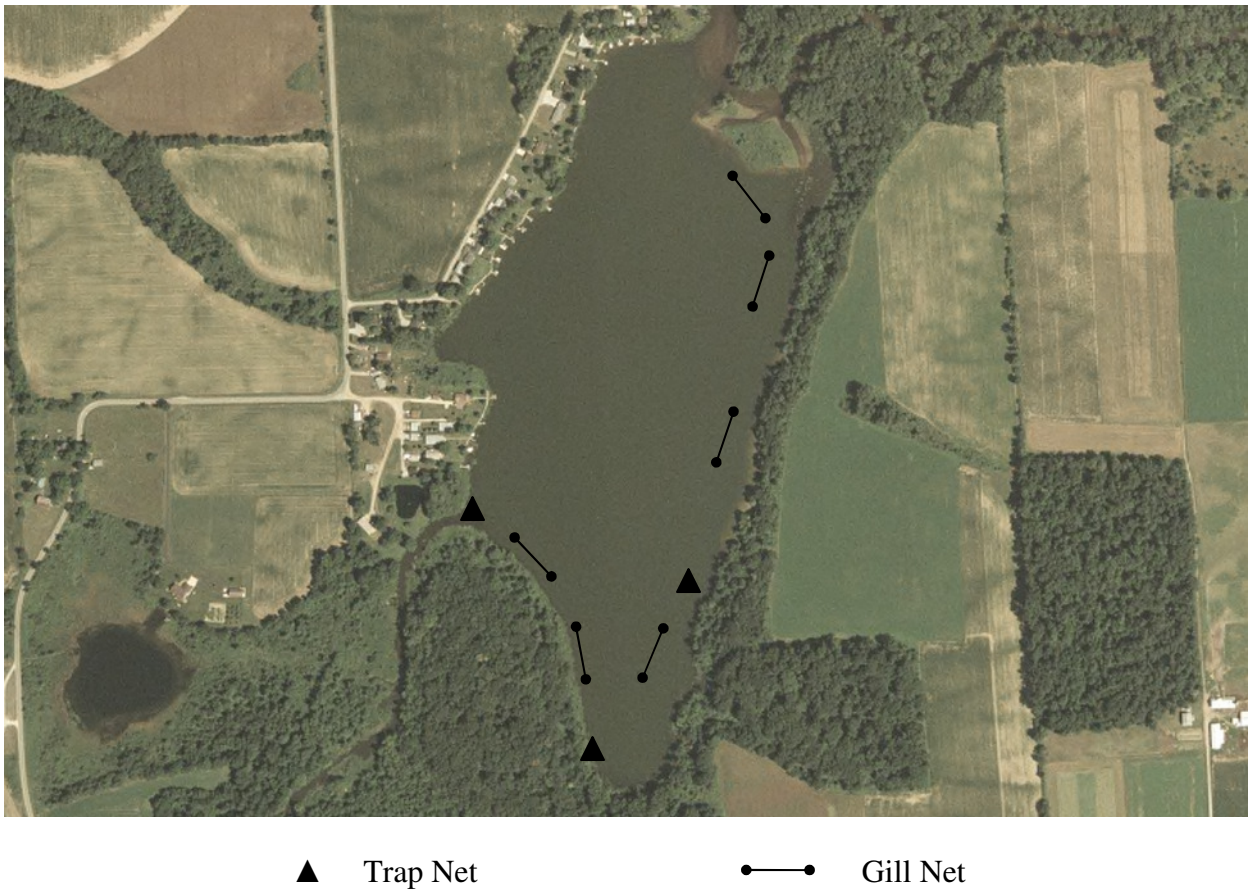

Figure 1. Aerial photo of Pigeon Lake with sample locations.

APPENDIX 1. Survey data pages

LAKE SURVEY REPORT

Type of Survey: [ ] Initial Survey [x] Re-Survey

Lake Name	County	Date of survey (Month, day, year)
Pigeon Lake	Lagrange County	May 29 - June 1, 2007
Biologist's name		**Date of approval (Month, day, year)**
Neil D. Ledet and Larry A. Koza		

LOCATION

Quadrangle Name	Range	Section
Lagrange	9E	27 & 34
Township Name	**Nearest Town**	
38N	Howe, Indiana	

ACCESSIBILITY

State owned public access site	Privately owned public access site	Other access site
On west shore off of CR 485N		

Surface acres	Maximum depth	Average depth	Acre feet	Water level	Extreme fluctuations
61	35 feet	19 feet	1,160	841.36	2-3 feet

Location of benchmark: None

INLETS

Name	Location	Origin
Pigeon River	Northeast	Cedar Swamp, Steuben Co.
Buck Creek	South	Drainage

OUTLETS

Name	Location
Pigeon River	North

Water level control: None

POOL	ELEVATION (Feet MSL)	ACRES
TOP OF DAM		
TOP OF FLOOD CONTROL POOL		
TOP OF CONSERVATION POOL		
TOP OF MINIMUM POOL		
STREAMBED		

Bottom type

- [ ] Boulder
- [x] Gravel
- [x] Sand
- [x] Muck
- [ ] Clay
- [ ] Marl

Watershed use: General agriculture, residential

Development of shoreline: Forty percent residential

Previous surveys and investigations: U.S.G.S. Hydrological survey, June 1957. IDNR Fisheries Surveys: Peterson, 1979.

SAMPLING EFFORT					
ELECTROFISHING	Day hours		Night hours 0.67		Total hours 0.67
TRAP NETS	Number of traps 1		Number of Lifts 3		Total effort 3 lifts
GILL NETS	Number of nets 2		Number of Lifts 3		Total effort 6 lifts
ROTENONE	Gallons	ppm	Acre Feet Treated	SHORELINE SEINING	Number of 100 Foot Seine Hauls

PHYSICAL AND CHEMICAL CHARACTERISTICS	
Color: light brown	Turbidity: 9 Feet 0 Inches (SECCHI DISK)
Alkalinity (ppm)*: Surface: 257.4 Bottom: 291.7	pH: Surface: Bottom:
Conductivity: 550 micromhos	Air temperature: 80 ℉
Water chemistry GPS coordinates: N 41.7113	W 85.48038

TEMPERATURE AND DISSOLVED OXYGEN (D.O.)								
DEPTH (FEET)	Degrees (℉)	D.O. (ppm)	DEPTH (FEET)	DEGREES (℉)	D.O. (ppm)	DEPTH (FEET)	DEGREES (℉)	D.O. (ppm)
SURFACE	71.3	8.6	36			72		
2	70.2	8.5	38			74		
4	69.2	7.9	40			76		
6	68.0	7.9	42			78		
8	67.4	7.5	44			80		
10	66.6	7.6	46			82		
12	65.4	7.1	48			84		
14	63.5	5.8	50			86		
16	58.7	2.6	52			88		
18	54.3	0.2	54			90		
20	51.1	0.1	56			92		
22	48.4	0.1	58			94		
24	47.1	0.1	60			96		
26	46.3	0.1	62			98		
28	45.9	0.1	64			100		
30	45.5	0.0	66					
32			68					
34			70					

COMMENTS

*ppm-parts per million

SPECIES AND RELATIVE ABUNDANCE OF FISHES COLLECTED BY NUMBER AND WEIGHT					
*COMMON NAME OF FISH	NUMBER	PERCENT	LENGTH RANGE (inches)	WEIGHT (pounds)	PERCENT
Bluegill	281	50.0	1.8 - 9.0	39.25	13.6
Golden redhorse	61	10.9	4.6 - 18.8	40.91	14.1
Largemouth bass	54	9.6	3.2 - 14.2	28.42	9.8
Spotted Sucker	42	7.5	3.6 - 15.9	31.66	10.9
Gizzard shad	35	6.2	12.8 - 16.6	31.01	10.7
White sucker	12	2.1	9.8 - 18.3	15.02	5.2
Black crappie	11	2.0	4.9 - 9.0	1.90	0.7
Northern pike	11	2.0	22.4 - 33.3	46.70	16.1
Smallmouth bass	9	1.6	3.9 - 14.0	2.65	0.9
Yellow perch	9	1.6	3.3 - 6.0	0.60	0.2
Brown bullhead	5	0.9	10.5 - 12.3	3.51	1.2
Common carp	5	0.9	20.9 - 28.3	35.82	12.4
Rock bass	5	0.9	4.3 - 7.2	0.71	0.2
Golden shiner	4	0.7	4.0 - 6.7	0.34	0.1
Channel catfish	3	0.5	8.6 - 15.6	1.68	0.6
Pumpkinseed	3	0.5	2.4 - 5.3	0.21	0.1
Bowfin	2	0.4	19.2 - 20.6	5.24	1.8
Redear	2	0.4	7.2 - 8.0	0.66	0.2
Spotted gar	2	0.4	14.8 - 20.2	1.30	0.4
Warmouth	2	0.4	7.2	0.55	0.2
Bluntnose minnow	1	0.2	2.7	0.01	**
Rainbow trout	1	0.2	11.9	0.64	0.2
Trout perch	1	0.2	3.2	0.02	**
Yellow bullhead	1	0.2	9.0	0.41	0.1
Total (24 Species)	562			289.22	

*Common names of fishes recognized by the American Fisheries Society.

**Less than 0.1 percent

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF BLUEGILL									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5	2	0.7	0.01	1	19.5				
2.0	1	0.4	0.01	1	20.0				
2.5	4	1.4	0.01	2	20.5				
3.0	13	4.6	0.03	2	21.0				
3.5	52	18.5	0.04	2	21.5				
4.0	44	15.7	0.05	2	22.0				
4.5	40	14.2	0.07	2,3	22.5				
5.0	25	8.9	0.10	2,3	23.0				
5.5	14	5.0	0.13	2	23.5				
6.0	16	5.7	0.18	2,3,4	24.0				
6.5	13	4.6	0.22	3,4	24.5				
7.0	18	6.4	0.28	4	25.0				
7.5	14	5.0	0.35	4,5	25.5				
8.0	13	4.6	0.43	4,5,6	26.0				
8.5	10	3.6	0.49	4,5,6	TOTAL	281			
9.0	2	0.7	0.55	6					
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5									
13.0									
13.5									
14.0									
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	336 /hr	GILL NET CATCH	8/lift	TRAP NET CATCH	3/lift

AGE-LENGTH KEY FOR BLUEGILL														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5	2	1	2											
2.0	1	1	1											
2.5	4	3		4										
3.0	13	4		13										
3.5	52	5		52										
4.0	44	5		44										
4.5	40	5		32	8									
5.0	25	5		20	5									
5.5	14	5		14										
6.0	16	5		3	10	3								
6.5	13	5			5	8								
7.0	18	5				18								
7.5	14	4				10	4							
8.0	13	5				8	3	2						
8.5	10	5				2	2	6						
9.0	2	1						2						
Total	281	64	3	182	28	49	9	10						
Mean TL			1.9	4.4	5.7	7.4	8.2	8.7						
SE			0.17	0.06	0.20	0.10	0.12	0.09						

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF LARGEMOUTH BASS									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0	1	1.9	0.02	1	21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0	4	7.4	0.12	2	24.0				
6.5	3	5.6	0.14	2	24.5				
7.0	4	7.4	0.19	2	25.0				
7.5	8	14.8	0.21	2	25.5				
8.0	3	5.6	0.28	2	26.0				
8.5	2	3.7	0.33	3	TOTAL	54			
9.0	1	1.9	0.36	2					
9.5	2	3.7	0.43	3					
10.0	6	11.1	0.53	3					
10.5	5	9.3	0.60	3					
11.0	4	7.4	0.72	3					
11.5	1	1.9	0.79	3					
12.0	2	3.7	0.90	3					
12.5									
13.0									
13.5	4	7.4	1.28	4,5					
14.0	4	7.4	1.41	4,5					
14.5									
15.0									
15.5									
16.0									
16.5									
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	75/hr	GILL NET CATCH	1/lift	TRAP NET CATCH	0/lift

AGE-LENGTH KEY FOR LARGEMOUTH BASS														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5														
3.0	1	1	1											
3.5														
4.0														
4.5														
5.0														
5.5														
6.0	4	2		4										
6.5	3	3		3										
7.0	4	4		4										
7.5	8	8		8										
8.0	3	3		3										
8.5	2	1			2									
9.0	1	1		1										
9.5	2	2			2									
10.0	6	6			6									
10.5	5	5			5									
11.0	4	4			4									
11.5	1	1			1									
12.0	2	2			1	1								
12.5														
13.0														
13.5	4	4				3	1							
14.0	4	4				1	3							
Total	54	51	1	23	21	5	4							
Mean TL			3.3	7.4	10.5	13.6	14.1							
SE				0.16	0.19	0.34	0.13							

NUMBER, PERCENTAGE, WEIGHT, AND AGE OF GIZZARD SHAD									
TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH	TOTAL LENGTH (inches)	NUMBER COLLECTED	PERCENT OF FISH COLLECTED	AVERAGE WEIGHT (pounds)	AGE OF FISH
1.0					19.0				
1.5					19.5				
2.0					20.0				
2.5					20.5				
3.0					21.0				
3.5					21.5				
4.0					22.0				
4.5					22.5				
5.0					23.0				
5.5					23.5				
6.0					24.0				
6.5					24.5				
7.0					25.0				
7.5					25.5				
8.0					26.0				
8.5					TOTAL	35			
9.0									
9.5									
10.0									
10.5									
11.0									
11.5									
12.0									
12.5	2	5.7	0.65	2					
13.0	6	17.1	0.72	2					
13.5	9	25.7	0.79	2					
14.0	8	22.9	0.87	2					
14.5	4	11.4	0.96						
15.0	2	5.7	1.07	3					
15.5									
16.0	2	5.7	1.30	4					
16.5	2	5.7	1.38	4					
17.0									
17.5									
18.0									
18.5									

ELECTROFISHING CATCH	28/hr	GILL NET CATCH	2/lift	TRAP NET CATCH	1/lift

AGE-LENGTH KEY FOR GIZZARD SHAD														
LENGTH GROUP (inches)	NUMBER COLLECTED	NUMBER AGED	AGE											
			1	2	3	4	5	6	7	8	9	10	11	12
1.0														
1.5														
2.0														
2.5														
3.0														
3.5														
4.0														
4.5														
5.0														
5.5														
6.0														
6.5														
7.0														
7.5														
8.0														
8.5														
9.0														
9.5														
10.0														
10.5														
11.0														
11.5														
12.0														
12.5	2	1		2										
13.0	6	1		6										
13.5	9	3		9										
14.0	8	4		8										
14.5	4	0												
15.0	2	1			2									
15.5														
16.0	2	1				2								
16.5	2	1				2								
Total	35	12		25	2	4								
Mean TL				13.7	15.3	16.5								
SE				0.10	0.00	0.14								

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Bluegill				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.8											
	2005	30	2.7-6.0	2.0	4.0						
	2004	7	4.9-6.8	1.4	3.3	5.7					
	2003	16	6.1-8.5	1.7	3.5	5.4	7.2				
	2002	4	7.8-8.6	2.0	3.9	5.8	7.3	8.1			
	2001	4	8.7-9.0	1.9	3.5	5.5	7.3	8.1	8.7		
	AVERAGE LENGTH			1.8	3.7	5.6	7.2	8.1	8.7		
	NUMBER AGED			61	61	31	24	8	4		

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
Largemouth bass				I	II	III	IV	V	VI	VII	VIII
Intercept = 0.8	2006	1*	3.2	2.8							
	2005	21	6.2-9.0	3.5	7.1						
	2004	19	8.7-12.3	2.8	7.4	10.3					
	2003	6	11.4-14.0	3.3	8.2	11.2	12.8				
	2002	4	13.9-14.2	3.4	7.8	10.6	12.5	13.9			
	AVERAGE LENGTH			3.2	7.4	10.5	12.7	13.9			
	NUMBER AGED			51	50	29	10	4			

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
				I	II	III	IV	V	VI	VII	VIII
Intercept =											
	AVERAGE LENGTH										
	NUMBER AGED										

Species	YEAR CLASS	NUMBER OF FISH AGED	SIZE RANGE	BACK CALCULATED LENGTH (inches) AT EACH AGE							
				I	II	III	IV	V	VI	VII	VIII
Intercept =											
	AVERAGE LENGTH										
	NUMBER AGED										

*Not included in average length calculations.

GPS SAMPLING COORDINATES												
GILL NETS				TRAP NETS				ELECTROFISHING			
1	N	41.70979	W 85.47930	1	N	41.70692	W 85.48107	1	N		W
	N		W	2	N	41.70950	W 85.48273		N		W
2	N	41.70800	W 85.48146	3	N	41.70845	W 85.47971	2	N		W
	N		W	4	N		W		N		W
3	N	41.71284	W 85.47849	5	N		W	3	N		W
	N		W	6	N		W		N		W
4	N	41.70773	W 85.48017	7	N		W	4	N		W
	N		W	8	N		W		N		W
5	N	41.71199	W 85.47861	9	N		W	5	N		W
	N		W	10	N		W		N		W
6	N	41.70897	W 85.48203	11	N		W	6	N		W
	N		W	12	N		W		N		W
7	N		W	13	N		W	7	N		W
	N		W	14	N		W		N		W
8	N		W	15	N		W	8	N		W
	N		W	16	N		W		N		W
9	N		W	17	N		W	9	N		W
	N		W	18	N		W		N		W
10	N		W	19	N		W	10	N		W
	N		W	20	N		W		N		W
11	N		W					11	N		W
	N		W						N		W
12	N		W					12	N		W
	N		W						N		W
13	N		W					13	N		W
	N		W						N		W
14	N		W					14	N		W
	N		W						N		W
15	N		W					15	N		W
	N		W						N		W
16	N		W					16	N		W
	N		W						N		W
17	N		W					17	N		W
	N		W						N		W
18	N		W					18	N		W
	N		W						N		W
19	N		W					19	N		W
	N		W						N		W
20	N		W					20	N		W
	N		W						N		W

Occurrence and Abundance of Submersed Aquatic Plants

Lake:	Pigeon Lake	Secchi(ft):	4.5	SE Mean species / site:	0.16
Date:	8/13/2007	Littoral sites with plants:	18	Mean natives / site:	0.73
Littoral Depth (ft):	13.0	Number of species:	6	SE Mean natives / site:	0.16
Littoral Sites:	34	Maximum species / site:	4	Species diversity:	0.63
Total Sites:	40	Mean species / site:	0.73	Native diversity:	0.63

	Frequency of	Score Frequency				
Species	**Occurrence**	**0**	**1**	**3**	**5**	**Dominance**
Coontail	40.0	60.0	25.0	5.0	10.0	18.0
Flat-stem pondweed	15.0	85.0	15.0			3.0
Elodea	7.5	92.5	7.5			1.5
Sago pondweed	5.0	95.0	2.5	2.5		2.0
Long-leaf pondweed	2.5	97.5	2.5			0.5
Variable pondweed	2.5	97.5	2.5			0.5

Other species noted: Curly-leaf pondweed

Emergent species noted: Arrowhead, lizard's tail, pickerelweed, spatterdock, white waterlily.